

***Comatricha parvula* sp. nov. and other myxomycetes recorded from Extremadura (Spain) and adjacent areas**

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ABSTRACT—Sixty-three myxomycete species from the southwestern Iberian Peninsula are recorded. The most interesting species are commented upon and presented with LM and SEM microphotographs of their distinguishing features. *Comatricha parvula* is described as a new species characterised by its small size and compared with morphologically similar species.

KEY WORDS—*Amoebozoa*, chorology, myxobiota, slime moulds, taxonomy

Introduction

The current work focuses on a Mediterranean area located in the western southwest Iberian Peninsula and considered to be of great biogeographical interest. The region includes the Autonomous Communities of Extremadura, west Castilla-La Mancha and north Andalucía (FIG. 1). Climatically, this area is part of the Mediterranean domain, with a prominent summer dry period and spring and autumn rainfall that can average 650 mm per year. The most studied woodland and shrubland communities are holm oak groves (*Quercus obtusifolia* Lam. [= *Quercus ilex* subsp. *ballota* (Desf.) Samp.]), cork oak groves (*Quercus suber* L.), meadows with holm oaks and cork oaks, Pyrenean oak groves (*Quercus pyrenaica* Willd.), chestnut groves (*Castanea sativa* Mill.),



FIG. 1.. The general study area covered during the research reported herein.

riparian forests (*Salix* spp., *Populus* spp., and *Ulmus* spp.), rockrose scrubs (*Cistus* spp.), pinewoods (*Pinus* spp.), and eucalyptus plantations (*Eucalyptus* spp.) (Arrojo Martín 2006).

The largest number of samples were obtained from “La Campiña Sur” where, as in much of Extremadura and bordering areas, there appear “dehesas” formed mainly by meadows with oaks and cork oaks. In places where human activity is not so obvious, native vegetation remnants appear as holm oak groves along with Mediterranean scrub communities. On the banks of streams and rivers, the dominant vegetation is represented by “adelfares” (*Nerium oleander* L.) and “tamujares” (*Securinega tinctoria* (Loefl.) Rothm.), accompanied by brambles (*Rubus ulmifolius* Schott), reeds (*Juncus* spp.), hawthorn (*Crataegus monogyna* Jacq.), and wild rosebushes (*Rosa* spp.). Prickly pear (*Opuntia ficus-indica* (L.) Mill.) also grows in particular areas.

In spite of the potential number of interesting habitats for myxomycete development, only a few studies have been carried out in this area, not sufficient for properly understanding the myxobiota of these communities. The most important work was carried out in Monfragüe National Park (Cáceres, Extremadura) by Moreno & al. (1990), who tabulated 60 species.

Subsequent studies (Moreno & al. 1991) increased the number of species to 83. In the decade of the 1990's, new sites increased with the studies of García & al. (1996), Illana & al. (1997), and Castillo & al. (2000) and the doctoral theses by Illana (1992) and Castillo (1999). Finally, in the 2000's, Oltra & Lado (2015, 2016) covered myxomycete species from the entire Iberian Peninsula.

Material & methods

The examined material included specimens obtained from field samples (collected mainly by J.R. García) that represented 63 species of myxomycetes. Specimens were deposited in the herbarium of the Life Sciences Department (Botany), University of Alcalá, Madrid, Spain (AH).

Spore measurements (taken using oil immersion) include surface structures such as spines or warts. Light microscopy (LM) was carried out with a Nikon Eclipse 80i microscope equipped with a DS-5M automatic photographic system. Scanning electron micrographs (SEM) were produced by a Zeiss DSM-950 microscope. For ultramicroscopic studies, material was rehydrated in concentrated ammonium hydroxide (28–30%) for 30 min, dehydrated in aqueous ethanol (70%) for 30 min, fixed for 2 h in pure ethylene glycol dimethyl ether (1,2-dimethoxymethane), and finally immersed in pure acetone for at least 2 h. This was followed by critical point drying and sputtering with gold-palladium. This technique allows the use of very little material (i.e., part of a single sporocarp or sometimes no more than a few spores). Terminology used to describe spore ornamentation follows Rammeloo (1974, 1975).

Taxonomy

Arcyria affinis Rostaf., Sluzowkce Monogr.: 276. 1875.

FIG. 2

The sample AH 48694 comprises grouped sporocarps with stalks that reach 0.7 mm long. Capillitium rosy to yellow-creamy, falling easily from the calyculus and expanding over the substrate. Capillitial threads with a variable and patent ornamentation consisting of warts, spines, and cogs, similar to those indicated by Nannenga-Bremekamp (1991). Spores 7–8 μm in diam., globose to subglobose, with the ornamentation typical of *Arcyria* species. Under SEM the inner surface of calyculus is ornamented by a well-developed reticulum. The capillitial tubes with abundant thick half rings and cogs, and spore ornamentation is formed by little baculae and a few groups of more prominent warts.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo El Cañaveral, on wood of *Nerium oleander*, 10-I-1993, leg. J.R. García (AH 16468); 24-I-1995, leg. J.R. García (AH 48694 with *Physarum album*); 24-I-1995, leg. J.R. García (AH 48695, with *Comatricha nigra*, *Licea kleistobolus*, and *Physarum album*).

COMMENTS—Our species concept of *Arcyria affinis* follows Nannenga-Bremekamp (1991), who considered *A. similis* (Racib.) Racib. ex Berl. a synonym (see also Lado 2018).

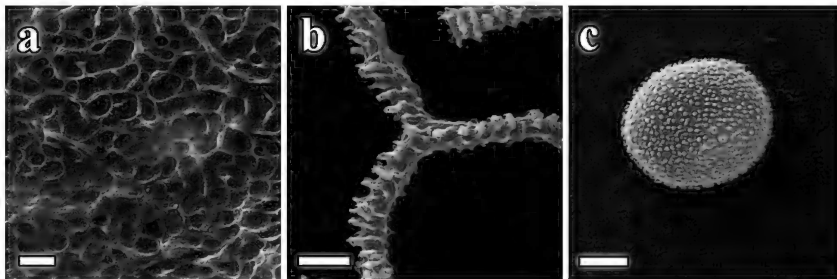


FIG. 2. *Arcyria affinis* (AH 48694). a. Detail of the reticulated inner surface of the calyculus. b. Capillitium. c. Detail of spore ornamentation (SEM). Scale bars: a–c = 2 μm , b = 5 μm .

Arcyria cinerea (Bull.) Pers., Syn. Meth. Fung.: 184. 1801.

FIG. 3

Sporocarps grouped, the capillitium congested, slightly elastic, yellowish white. Spores globose to subglobose, 6–7 μm diam., yellowish grey. Under SEM the inner surface of calyculus is ornamented by faint warts and a fine reticulum. The capillitial tubes abundant and with thick warts; the spores are ornamented by little baculae and a few groups of more prominent warts.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on wood of *Nerium oleander*, 30-IX-1989, leg. J.R. García (AH 48649, with *Comatricha anomala*); on wood

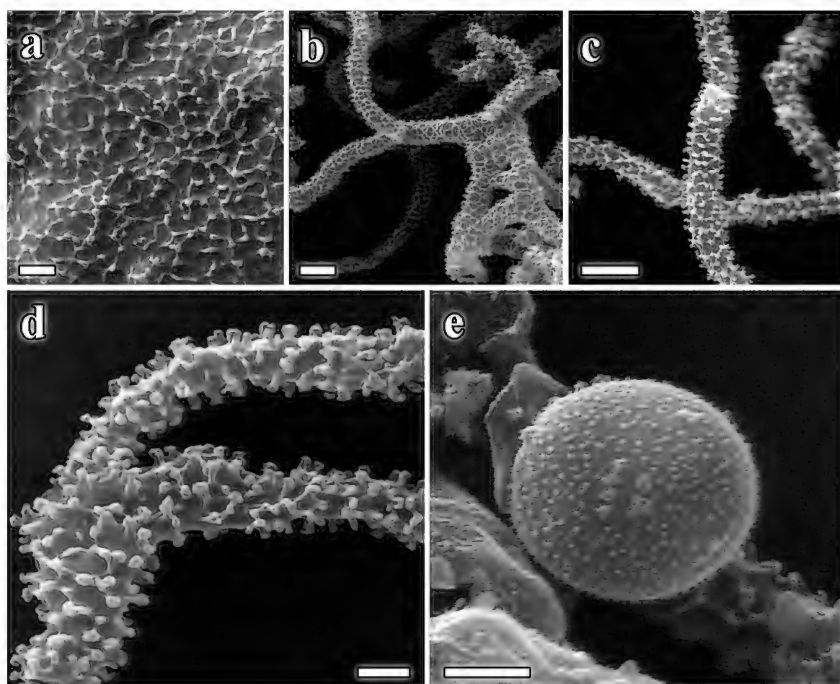


FIG. 3. *Arcyria cinerea* (AH 20688). a. Detail of the calyculus inner surface with warts and a fine reticulum. b-c. Capillitium. d. Detail of capillitium ornamentation (SEM). e. Detail of spore ornamentation (SEM). Scale bars: a, d, e = 2 μ m, b, c = 5 μ m.

of *Nerium oleander*, 7-VI-1991, leg. J.R. García (AH 16372, with *Trichia affinis*); Finca La Sierra, on wood of *Eucalyptus* sp., 15-X-1989, leg. J.R. García (AH 48650); **Granja de Torrehermosa**, Arroyo Quejigo, on wood of *Populus alba*, 9-X-1992, leg. J.R. García (AH 48744, with *Trichia crateriformis*); twigs of *Rubus* sp., 31-X-1992, leg. J.R. García (AH 16325); on wood of *Populus alba*, 24-I-1995, leg. J.R. García (AH 20688, with *Arcyria incarnata*).

COMMENTS—The sample AH 20688 contains two *Arcyria* species, *A. incarnata*, and *A. cinerea*, which can be confused because both produce mature stages that may have yellowish hues. *Arcyria incarnata* is distinguished by its scattered fructifications that are generally globose to subglobose, a capillitium that forms a lax net, and larger (7.1–9.4 μ m diam.) spores (Rammeloo 1981).

Arcyria incarnata (Pers. ex J.F. Gmel.) Pers., *Observ. Mycol.* 1: 58. 1796. FIG. 4

Capillitium elastic, lax, pale yellowish pink. Under SEM the inner surface of the calyculus is ornamented by prominent spines. The tubes of the capillitium have abundant spines, rings, and half rings, and the spore ornamentation is typical of *Arcyria* species.

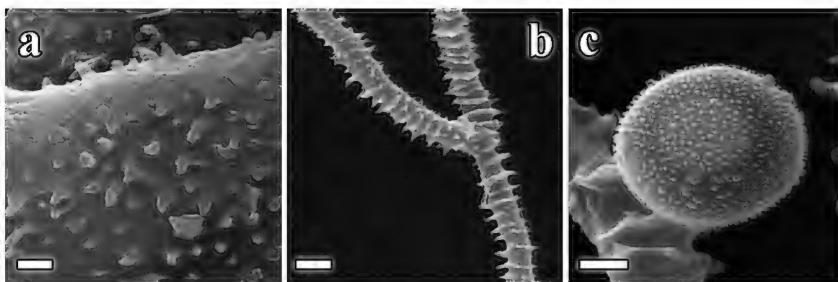


FIG. 4. *Arcyria incarnata* (AH 20688). a. Detail of the calyculus inner surface with spines. b. Capillitium. c. Detail of spore ornamentation (SEM). Scale bars: a-c = 2 μ m, b = 5 μ m.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on wood of *Populus alba*, 1-I-1991, leg. J.R. García (AH 48652); on wood of *Rubus* sp., 20-X-1991, leg. J.R. García (AH 48698, with *Comatricha anomala*); Granja de Torrehermosa, Arroyo Quejigo, on wood of *Populus alba*, 24-I-1995, leg. J.R. García (AH 20688, with *Arcyria cinerea*); Peraleda del Zaucejo, Finca Galafate, Puente Arroyo del Madroño, on wood of *Salix fragilis*, 21-X-1994, leg. J.R. García (AH 16267); CÓRDOBA, Fuente Obejuna, Cortijo El Río, debris of *Eucalyptus* sp., 24-XI-1994, leg. J.R. García (AH 48686).

Arcyria minuta Buchet, Mém. Acad. Malagache 6: 42. 1927.

FIG. 5

Sporocarps small, <3 $\times$ 1.3 mm, rosy to flesh-coloured. Stalk dark, about 1 mm long. Calyculus <0.7 mm diam. Capillitium firmly attached to the calyculus. Capillitial threads non-elastic, ornamented with rings. Under SEM the capillitial tubes show prominent warts, rings, and half rings, and the spores exhibit the ornamentation typical of *Arcyria* species.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on wood of *Nerium oleander*, 11-IX-1991, leg. J.R. García (AH 48697); 2-IV-1991, leg. J.R. García (AH 48651).

COMMENTS—*Arcyria minuta* is characterised by its small size. According to Rammeloo (1981), *Arcyria insignis* Kalchbr. & Cooke can be distinguished

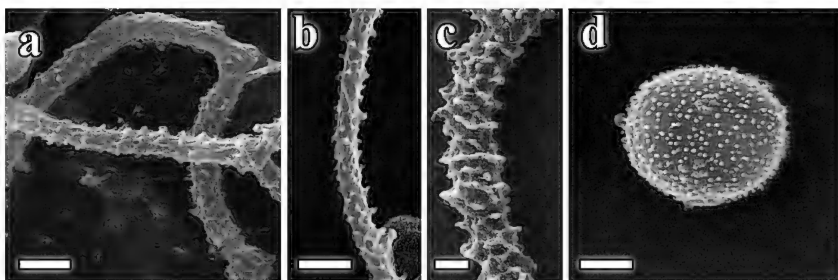


FIG. 5. *Arcyria minuta* (AH48651). a-b. Capillitium. c. Detail of the capillitium ornamentation (SEM). d. Detail of spore ornamentation (SEM). Scale bars: a-b = 5 μ m, c-d = 2 μ m.

from *A. minuta* by its capillitium, which has a less conspicuous ornamentation consisting of spirally arranged warts.

Arcyria obvelata (Oeder) Onsberg, Mycologia 70: 1285. 1979 ["1978"].

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, dried trunk of *Populus* sp., 4-I-1988, leg. J.R. García (AH 48653); on wood of *Nerium oleander*, 11-IX-1991, leg. J.R. García (AH 48654).

Badhamia foliicola Lister, J. Bot. 35: 209.1897.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Finca Casas Viejas, leaves of *Quercus obtusifolia* and grasses, 23-VI-1992, leg. J.R. García (AH 48705); Fuentes de León, "Camino del Rincón", on leaves and twigs of *Quercus obtusifolia*, and grasses, 18-XI-1995, leg. J.R. García (AH 20677); Granja de Torrehermosa, Finca El Río, leaves of *Populus nigra*, 24-VI-1992, leg. J.R. García (AH 16527); CÁCERES, Hoyos, road to Valverde del Fresno, km 4, fronds/blades of *Pteridium aquilinum*, 25-XI-1995, leg. J.R. García (AH 20709); CÓRDOBA, Fuente Obejuna, Finca El Cintado, leaves of *Populus alba*, 27-XI-1995, leg. J.R. García (AH 20713); Cortijo El Río, grasses and debris of *Eucalyptus* sp., 1-XI-1997, leg. J.R. García (AH 46529, with *Physarum cinereum*).

COMMENTS—The sample AH 20713 from Finca El Cintado consists of decarbonated sporocarps, which gives them an iridescent colour. Capillitium badhamioid, formed by very thin filaments. The sample occurred on *Populus alba* leaves, which demonstrates the foliicolous habit of *Badhamia foliicola*.

The sample AH 20677 (on leaves and sticks of *Quercus obtusifolia*) is copious, with the sporocarps forming large colonies. Peridium decarbonated, with violaceous-iridescent colours, with white veins of calcium carbonate coming from the inner capillitium. Capillitium abundant, thin, white, and typically badhamioid. Spores 11–12 µm diam., globose to subglobose, free, pale violet, verrucose.

Finally, the spores of the sample AH 46529 appear in clusters that are easily separated, and some sporocarps have developed a whitish to straw-yellow stalk, such as Lister (1925) indicated.

Badhamia gracilis (T. Macbr.) T. Macbr., Myxomycetes: 35. 1934.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, close to Finca La Paloma, on cladodes of *Opuntia ficus-indica*, 26-X-1990, leg. J.R. García (AH 48660); close to Herrador's Valley, on cladodes of *Opuntia ficus-indica*, 14-IV-1991, leg. J.R. García (AH 48661); close to Finca La Jacoba, on cladodes of *Opuntia ficus-indica*, 10-X-1992, leg. J.R. García (AH 48655); 23-X-1997, leg. J.R. García (AH 48733, with *Physarum spectabile*; AH 48734).

COMMENTS—The sample AH 48661 fruited copiously on cladodes of *Opuntia ficus-indica*. Spores 13–15 µm diam., polyhedric, dark brown, verrucose.

Castillo & al. (1996) studied the type specimen of *Badhamia gracilis*, but our taxonomic concept follows Moreno & Oltra (2010).

Badhamia melanospora Speg., Anales Soc. Ci. Argent. 10: 150. 1880.

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Azuaga, close to Finca La Paloma, on cladodes of *Opuntia ficus-indica*, 26-X-1990, leg. J.R. García (AH 48659).

COMMENTS—The spores of the sample are typical of this species, being 18–20(–22) µm in diam, polyhedric, dark brown, and verrucose. When Castillo & al. (1996) studied the type material of *Badhamia melanospora*, they proposed the illegitimate combination *B. melanospora* var. *gracilis* (Speg.) A. Castillo & al. Moreno & Oltra (2010) later established that *B. melanospora* and *B. gracilis* represent different taxa, and our taxonomic concept follows those authors.

Badhamia panicea (Fr.) Rostaf.,

Jahrb. Nassauischen Vereins Naturk. 27–28: 71. 1873.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Granja de Torrehermosa, Arroyo Quejigo, bark of *Populus alba*, 26-X-1995, leg. J.R. García (AH 20686); close to Finca Rosa Martínez, 580 m, on wood of *Eucalyptus* sp., 7-XII-1997, leg. J.R. García (AH 48646, with *Comatricha tenerrima*); CÓRDOBA, Fuente Obejuna, Finca Las Canalejas, 540m, on bark of *Nerium oleander*, 12-I-1998, leg. J.R. García (AH 48658).

COMMENTS—The sporocarps of the sample AH 20686 have a badhamioid capillitium that tends to join in the centre of the sporocarp, forming the white pseudocolumella characteristic of *Badhamia panicea*, as indicated by Moreno & Oltra (2010).

Badhamia utricularis (Bull.) Berk., Trans. Linn. Soc. London 21: 153. 1853.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Finca El Morro, on twigs of *Quercus obtusifolia*, 27-XII-1991, leg. J.R. García (AH 48707); Arroyo Argallón, on wood of *Quercus obtusifolia*, 20-VI-1992, leg. J.R. García (AH 48710); Granja de Torrehermosa, Finca El Revuelo, on wood of *Pinus*, 20-XII-1991, leg. J.R. García (AH 16253); close to Finca El Río, on bark of *Quercus obtusifolia*, 31-XII-1991, leg. J.R. García (AH 48702); Arroyo Quejigo, on wood of *Populus alba*, 22-XII-1994, leg. J.R. García (AH 48684); CÁCERES, Hoyos, at the end of the village, crossroads with the road to Cilleros, on branch of *Quercus suber*, 26-XI-1995, leg. J.R. García (AH 20702).

COMMENTS—The sporocarps of the sample AH 16253 show abundant pseudostipes formed by of straw-yellow hypothallus, and clustered spores, which are easily separated under pressure. However, the sporocarps of the sample AH 48707 show a very shrunken or even absent hypothallus, although the spores remain together.

Ceratiomyxa fruticulosa (O.F. Müll.) T. Macbr.,

N. Amer. Slime-Moulds: 18. 1899.

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, 540 m, on bark of *Populus nigra*, 6-XII-1995, leg. J.R. García (AH 20683, with *Trichia varia*).

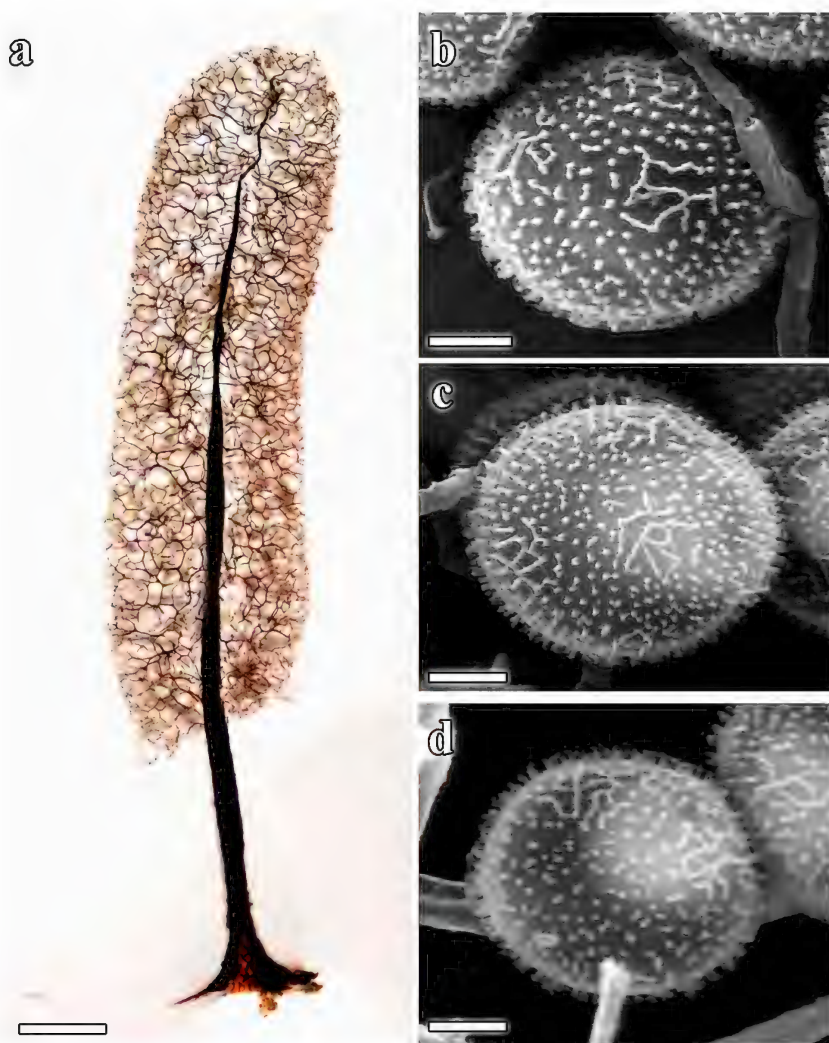


FIG. 6. *Comatricha anomala* (AH 48701). a. Sporocarp. (AH 48698) b-d. Detail of the spore ornamentation (SEM). Scale bars: a = 200 μ m, b-d = 2 μ m.

***Comatricha anomala* Rammeloo,**

Bull. Jard. Bot. Natl. Belg. 46: 237. 1976.

FIG. 6

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on wood of *Nerium oleander*, 30-IX-1989, leg. J.R. García (AH 48649, with *Arcyria cinerea*); on wood of *Populus nigra*, 1-IX-1990, leg. J.R. García (AH 48701); on wood of *Populus alba*, 11-X-1991, leg. J.R. García (AH 48699); on debris of *Rubus* sp., 20-X-1991, leg. J.R. García (AH 48698, with *Arcyria incarnata*).

COMMENTS—Sporotheca cylindrical, stalk short in relation to the sporotheca. The spore ornamentation, distinctive in *Comatrucha anomala*, consists of warts that sometimes become attached to form a partial and incomplete reticulum. In Spain, *Comatrucha anomala* fruits mainly on oleander (*Nerium oleander*), poplar (*Populus nigra*), and oak (*Quercus obtusifolia*). Although a globally rare species, *C. anomala* is common in the Mediterranean region. Mainly cited in Europe (<http://www.discoverlife.org>), it is also reported from Mexico, including Baja California (Lizárraga & al. 1997, 2004), Chihuahua (Lizárraga & al. 2005), and Sonora (Lizárraga & al. 2008).

Comatrucha nigra (Pers. ex J.F. Gmel.) J. Schröt., Pilze Schles. 1: 118. 1885.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, wood of *Nerium oleander*, 1-I-1990, leg. J.R. García (AH 48666); 28-XII-1991, leg. J.R. García (AH 16264, with *Comatrucha parvula*); 22-I-1992, leg. J.R. García (AH 48716); 10-VI-1993, leg. J.R. García (AH 16482, with *Didymium melanospermum* and *Physarum album*); Arroyo El Cañaveral, on wood of *Nerium oleander*, 24-I-1995, leg. J.R. García (AH 48695, with *Arcyria affinis*, *Licea kleistobolus*, and *Physarum album*); 450 m, 26-XII-1996, leg. J.R. García (AH 20676); Granja de Torrehermosa, Arroyo Quejigo, on burnt wood of *Populus alba*, 31-X-1992, leg. J.R. García (AH 48657); on wood of *Populus nigra*, 12-XI-1993, leg. J.R. García (AH 48712); on wood of *Populus alba*, 24-I-1995, leg. J.R. García (AH 20701); 500 m, 27-XI-1995, leg. J.R. García (AH 20706); Trasierra, little meadow, 640 m, on debris of *Pinus pinea*, 15-XI-1997, leg. J.R. García (AH 48644, with *Comatrucha pulchella* and *Craterium leucocephalum*); CÓRDOBA, Fuente Obejuna, Finca Las Canalejas, on bark of *Nerium oleander*, 7-VI-1991, leg. J.R. García (AH 48667); Fuente Obejuna, cortijo del Río, en restos de *Eucalyptus* sp., 24-XI-1994, leg. J.R. García (AH 48687; AH 48688); 27-XI-1995, leg. J.R. García (AH 20711).

Comatrucha parvula G. Moreno, López-Vill., A. Castillo & J.R. García,
sp. nov.

FIG. 7

MYCOBANK MB 825357

Differs from *Comatrucha laxa* by its shorter stalk and its capillitium forming a well-developed external net at the basal half of the sporotheca; from *C. ellae* by its columella with more or less perpendicular main branches; and from *C. variabilis* by its shorter stalk, its capillitium forming a well-developed external net at the basal half of the sporotheca, and its smaller spores.

TYPE: Spain, Badajoz, Azuaga, Arroyo Argallón, on wood of *Populus* sp., 20-VI-1992, leg. J.R. García (Holotype, AH 16428).

ETYMOLOGY: Latin *parvula* (= very small), refers to the size of the sporocarps.

Sporocarps stalked, scattered to gregarious, sometimes growing in large colonies, 1.2–2 mm long. Sporotheca ovoid to slightly prolate, 0.5–0.9 mm long. Stalk as long as the sporotheca or even longer, dark brown with a

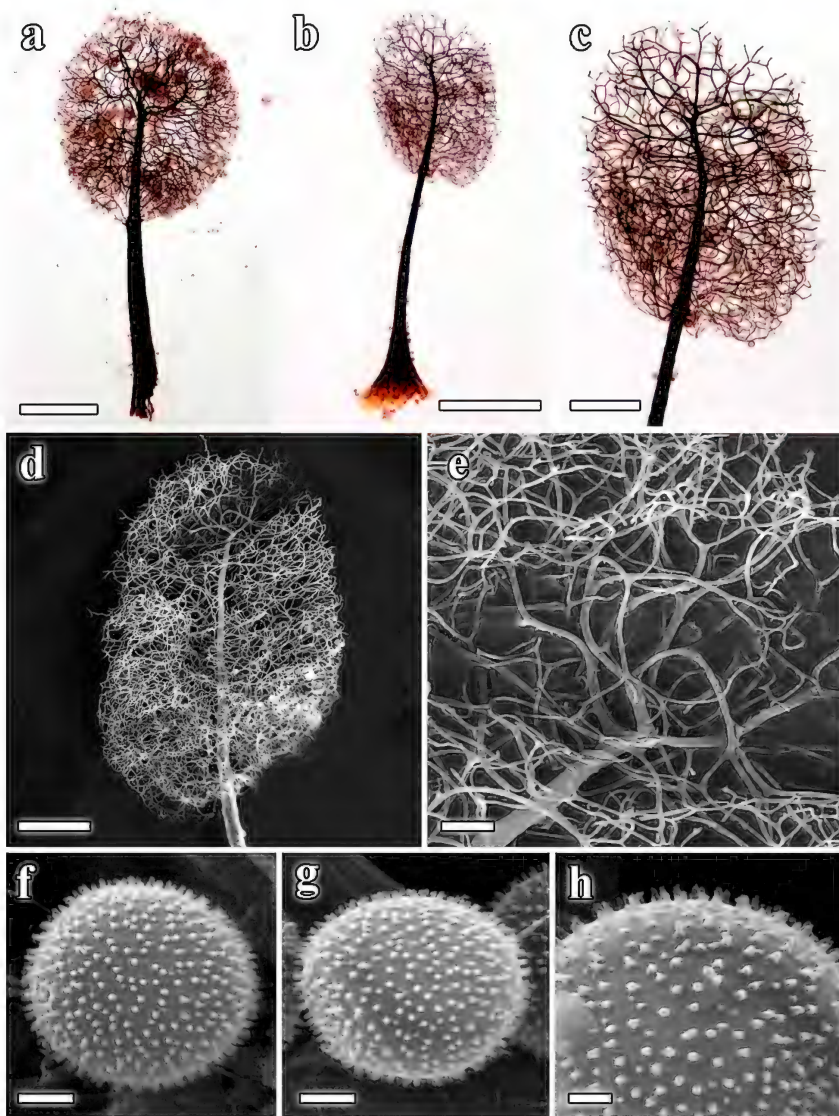


FIG. 7. *Comatricha parvula* (AH 16428 holotype). a-b. Sporocarps. c. Detail of the sporotheca by LM. d. Detail of the sporotheca (SEM). e. Detail of the columella nearly reaching the apex, ending in short branches (SEM). f-g. Spore. h. Detail of spore ornamentation (SEM). Scale bars: a-b = 0.25 mm, c = 0.1 mm, d = 100 μ m, e = 20 μ m, f-g = 2 μ m, h = 1 μ m.

fibrous, reddish-brown base. Columella nearly reaching the apex, ending in 2–5 short branches. Capillitium dense, spreading from the columella with more or less perpendicular main branches, forming a well-developed, external net at the basal half of the sporotheca. Capillitium threads spiny and broadly dichotomous at the ends. Collar present. Spores $9.4\text{--}11.4 \times 9\text{--}11\text{ }\mu\text{m}$ diam., av. $10.4 \times 10\text{ }\mu\text{m}$, $Q = 1\text{--}1.04$ ($n = 25$), globose to subglobose, violaceous-brown by transmitted light, verrucose. Under SEM we can observe the sporotheca with a dense capillitium formed by filaments with small dispersed spines. The columella ends in several main branches. The spore ornamentation is formed by homogenously distributed baculae.

HABITAT & DISTRIBUTION: Occurring on the wood and bark of such species as *Nerium oleander*, *Pinus* spp., *Populus alba*, and *Populus nigra* and currently known only from Badajoz (Extremadura) and Córdoba (Andalucía), Spain.

ADDITIONAL SPECIMENS EXAMINED: **SPAIN, BADAJOZ,** Azuaga, Arroyo Argallón, on wood of *Nerium oleander*, 28-XII-1991, leg. J.R. García (AH 16264, with *Comatriza nigra*); on wood of *Nerium oleander*, 10-VI-1993, leg. J.R. García (AH 16279); **Graña de Torrehermosa**, Arroyo Quejigo, on wood of *Populus alba*, 31-X-1992, leg. J.R. García (AH 16432); on wood of *Populus nigra*, 12-XI-1993, leg. J.R. García (AH 16366); on burnt wood of *Populus alba*, 4-XI-1994, leg. J.R. García (AH 18434); 19-XI-1994, leg. J.R. García (AH 18437); Finca El Revuelo de Hermenegildo, on wood of *Pinus* sp., 12-XII-1992, leg. J.R. García (AH 15505); **CÓRDOBA, Fuente Obejuna**, Cortijo El Río, on bark of *Populus alba*, 27-XI-1995, leg. J.R. García (AH 20714).

COMMENTS—*Comatriza parvula* is characterised by its small size, a capillitium that forms a net in the basal half of the sporotheca but is more open towards the apex, and a columella ramifying at various points at the apex.

A morphologically similar species is *Comatriza laxa* Rostaf., which has a longer (c. 1 mm) stalk and a capillitium that is totally lax and hence does not form an external net. *Comatriza ellae* Härk. is also a small species, but its capillitium is more lax than in *C. parvula* and lacks branches at the apex of the columella. *Comatriza variabilis* R.K. Chopra & T.N. Lakh. has longer stalks (twice the length of the sporotheca), its capillitium lacks both a well-developed net at the sporothecal base and branches at the columellar apex, and its spores are larger ($10\text{--}12.5\text{ }\mu\text{m}$ diam.).

Comatriza microcarpa (Meyl.) Kowalski, another similar species, has spores $11\text{--}13\text{ }\mu\text{m}$ diam. and a sparse rigid capillitium that often comprises only 5 or 6 major branches, which further divide one or two times to taper towards the free extremities without anastomosing (Kowalski 1975). Kowalski compared *C. microcarpa* with *Paradiacheopsis rigida* (Brândză) Nann.-Bremek., and indicated that it probably represents the most closely related taxon. Moreno

& al. (2018) carried out a study of *P. rigida* and proposed a lectotype, which is conserved in BM. *Comatricha microcarpa* was considered a nomen ambiguum by Castillo & al. (1997).

Comatricha pulchella (C. Bab.) Rostaf., Sluzowkce Monogr. Suppl.: 27. 1876.

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Trasierra, little meadow, 640 m, on debris of *Pinus pinea*, 15-XI-1997, leg. J.R. García (AH 48644, with *Comatricha nigra* and *Craterium leucocephalum*).

Comatricha tenerrima (M.A. Curtis) G. Lister,

Guide Brit. Mycetoza, ed. 4: 39. 1919.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on debris of *Heracleum mantegazzianum* and *Epilobium hirsutum*, 1-XI-1997, leg. J.R. García (AH 48753, AH 48754); Granja de Torrehermosa, close to Finca Rosa Martínez, 580 m, on wood of *Eucalyptus* sp., 7-XII-1997, leg. J.R. García (AH 48646, with *Badhamia panicea*); Maguilla, Finca Las Ventas, on plant debris, 1-XI-1995, leg. J.R. García (AH 20703).

Craterium leucocephalum (Pers. ex J.F. Gmel.) Ditmar,

Deutschl. Fl. Pilze 1(1): 21. 1813.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, 540 m, on wood of *Nerium oleander* and twigs of *Rubus* sp., 19-X-1997, leg. J.R. García (AH 46530, with *Stemonitis fusca*); Finca Casas Viejas, 380 m, on leaves of *Quercus obtusifolia*, 28-XII-1995, leg. J.R. García (AH 20684, with *Didymium clavus*); Trasierra, little meadow, 640 m, on debris of *Pinus pinea*, 15-XI-1997, leg. J.R. García (AH 48644, with *Comatricha nigra* and *C. pulchella*).

Craterium minutum (Leers) Fr., Syst. Mycol. 3: 151. 1829.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on twigs of *Rubus* sp., 1-XII-1990, leg. J.R. García (AH 48668); 11-I-1991, leg. J.R. García (AH 48678); on fallen branch of *Quercus obtusifolia*, 1-II-1991, leg. J.R. García (AH 48680); CÓRDOBA, Fuente Obejuna, Finca Las Canalejas, on twigs of *Rubus* sp., 11-I-1991, leg. J.R. García (AH 48677).

Cribraria cancellata (Batsch) Nann.-Bremek.,

Nederlandse Myxomyceten: 92. 1975 [“1974”].

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on dry twigs of *Nerium oleander*, 10-XII-1989, leg. J.R. García (AH 48679).

Cribraria violacea Rex, Proc. Acad. Nat. Sci. Philadelphia 43: 393. 1891.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on wood of *Nerium oleander*, 11-I-1991, leg. J.R. García (AH 48690, with *Hemitrichia clavata*); 27-VII-1991, leg. J.R. García (AH 48704).

Diachea leucopodia (Bull.) Rostaf., Sluzowkce Monogr.: 190. 1874.

SPECIMEN EXAMINED: SPAIN, CÓRDOBA, Fuente Obejuna, Cortijo El Río, grasses and debris of *Eucalyptus* sp., 1-XI-1997, leg. J.R. García (AH 46527).

Dictydiaethalium plumbeum (Schumach.) Rostaf., Monogr. Mycetoza: 157. 1984.

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Azuaga, Cortijo La Herejía, 550 m, on bark of *Populus nigra*, 26-I-1998, leg. J.R. García (AH 46528).

COMMENTS—The sample shows the typical remnants of the silvery hypothallus covering the aethalium and the substrate. Spores 8–10 µm diam., globose to subglobose, hyaline-yellow in transmitted light, free, spiny.

Didymium bahiense Gottsb., Nova Hedwigia 15: 365. 1968.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Finca La Jacoba, on leaves of *Quercus obtusifolia*, 6-III-1992, leg. J.R. García (AH 16338, with *Didymium clavus*, *D. megalosporum*, and *D. squamulosum*); close to Finca La Jacoba, on leaves and twigs of *Quercus obtusifolia*, 6-III-1992, leg. J.R. García (AH 48715, with *Didymium megalosporum*); Granja de Torrehermosa, Granja-Peraleda road, km 10, Zújar rives, on leaves of *Populus alba*, 15-X-1993, leg. J.R. García (AH 48669).

COMMENTS—The sample AH 48715 occurs along with *Didymium megalosporum*. *Didymium bahiense* has a discoid, whitish pseudocolumella, hyaline capillitial threads radiating from the pseudocolumella and becoming attached to the peridium. In contrast, *D. megalosporum* shows a flat, discoid, yellow-orange pseudocolumella, a larger sporotheca (0.7–0.9 mm diam.), and a paler stalk ranging in color from orange-brown to reddish-brown.

Didymium clavus (Alb. & Schwein.) Rabenh., Deutschl. Krypt.-Fl. 1: 280. 1844.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Finca La Jacoba, on leaves of *Quercus obtusifolia*, 6-III-1992, leg. J.R. García (AH 16338, with *Didymium bahiense*, *D. megalosporum*, and *D. squamulosum*); Finca Casas Viejas, 380 m, on leaves of *Quercus obtusifolia*, 26-XII-1995, leg. J.R. García (AH 20678); 28-XII-1995, leg. J.R. García (AH 20684, with *Craterium leucocephalum*).

Didymium difforme (Pers.) Gray, Nat. Arr. Brit. Pl. 1: 571. 1821.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on grasses, 1-XII-1990, leg. J.R. García (AH 48673); Granja de Torrehermosa, Arroyo Quejigo, on leaves of *Populus* sp. and *Juncus* sp., 22-XII-1994, leg. J.R. García (AH 48685, with *Didymium squamulosum*); CÓRDOBA, Fuente Obejuna, Cortijo El Río, on grasses (remains of a nest) under *Eucalyptus* sp., 1-XI-1997, leg. J.R. García (AH 48741).

Didymium laxifilum G. Lister & J. Ross, Essex Naturalist 27: 264. 1945. FIG. 8

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Peraleda del Zaucejo, Fuente del Juncal, 600 m, on debris of *Eucalyptus* sp., 31-XII-1995, leg. J.R. García (AH 20685).

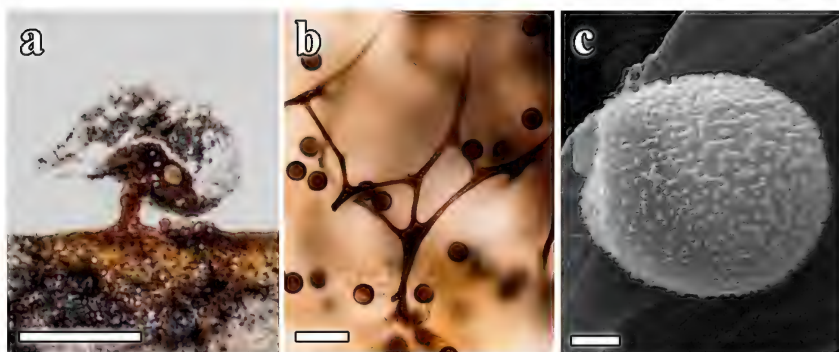


FIG. 8. *Didymium laxifilum* (AH 20685). a. Sporocarp. b. Capillitium. c. Detail of spore ornamentation (SEM). Scale bars: a = 1 mm, b = 25 µm, c = 2 µm.

COMMENTS—The differences between *D. laxifilum* and *D. rubeopus* are described below, as part of the description of the latter species. Under SEM, the spore ornamentation comprises warts that join to form short crests.

Didymium megalosporum Berk. & M.A. Curtis, Grevillea 2: 53. 1873.

The sample AH 20720 is copious and well developed. The morphological variability of the sporotheca is clearly shown. The sporotheca is irregular, varying from reniform to discoid and even from flat to lenticular; it is also umbilicate at the union with the stalk. Peridium slightly yellow, covered by white calcium carbonate crystals. Stalk longer than the sporotheca, brown to reddish-brown. Pseudocolumella well developed, flat, yellow to orange-yellow, rough. Capillitium emerging from the pseudocolumella and getting attached to the peridium. Spores 10–11 µm diam., globose to subglobose, violaceous-brown, verrucose.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, close to Herrador valley, on twigs and leaves of *Quercus obtusifolia*, 19-I-1992, leg. J.R. García (AH 48656); close to Finca La Jacoba, on leaves and twigs of *Quercus obtusifolia*, 6-III-1992, leg. J.R. García (AH 48715, with *Didymium bahiense*); Finca La Jacoba, on leaves of *Quercus obtusifolia*, 6-III-1992, leg. J.R. García (AH 16338, with *Didymium bahiense*, *D. clavus*, and *D. squamulosum*); CÁCERES, Hoyos, at the end of the village, crossroads with the road to Cilleros, on leaves of *Quercus suber*, 26-XI-1995, leg. J.R. García (AH 20720); CÓRDOBA, Fuente Obejuna, Cortijo El Río, on grasses and debris of *Eucalyptus* sp., 1-XI-1997, leg. J.R. García (AH 46531, with *Didymium nigripes* and *Physarum pusillum*); Finca El Cintado, on debris of *Eucalyptus* sp., 27-XI-1995, leg. J.R. García (AH 20712, with *Didymium nigripes* and *D. minus*).

Didymium melanospermum (Pers.) T. Macbr., N. Amer. Slime-Moulds: 88. 1899.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on leaves of *Populus nigra*, 10-VI-1993, leg. J.R. García (AH 16446); on wood of *Nerium oleander*, 10-VI-1993, leg. J.R. García (AH 16482, with *Comatricha nigra* and *Physarum leucophaeum*); Trasierra, little meadow, 640 m, on debris of *Cistus* sp., under *Pinus pinea*, 15-XI-1997, leg. J.R. García (AH 48645).

Didymium minus (Lister) Morgan, J. Cincinnati Soc. Nat. Hist. 16: 145. 1894.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Granja de Torrehermosa, Arroyo Quejigo, on leaves of *Populus nigra*, 12-XI-1993, leg. J.R. García (AH 48714); CIUDAD REAL, Parque Nacional de Cabañeros, leaves, 18-X-2001, leg. G. Moreno (AH 48749).

Didymium nigripes (Link) Fr., Syst. Mycol. 3: 119. 1829.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Pallares, road to Ventas del Culebrín, km. 2, on debris of *Populus alba*, *Ulmus* sp., and *Juncus* sp., 27-XI-1995, leg. J.R. García (AH 20719); Azuaga, Arroyo Argallón, on non-determined leaves and twigs, leg. J.R. García (AH 16259, with *Physarum album*, and *Physarum leucophaeum*); on debris of grasses, X-1990, leg. J.R. García (AH 16746); on debris of *Rubus* sp. and *Nerium oleander*, 19-X-1997, leg. J.R. García (AH 48751); on debris of *Heracleum mantegazzianum* and *Mentha suaveolens*, 1-XI-1997, leg. J.R. García (AH 46471, with *Lamproderma scintillans*); Granja de Torrehermosa, Arroyo Quejigo, on leaves of *Populus nigra*, 12-XI-1993, leg. J.R. García (AH 48711); on leaves of *Populus alba*, 24-XI-1995, leg. J.R. García (AH 20715); Granja-Peraleda road, km 10, río Zújar, on leaves of *Populus alba*, 15-X-1992, leg. J.R. García (AH 16307); Finca El Río, Zújar river, on debris of grasses and *Juncus* sp. under *Quercus obtusifolia*, 24-VI-1992, leg. J.R. García (AH 16175, with *Physarum leucophaeum*); Maguilla, Finca Las Ventas, on debris of grasses and mosses, 1-XI-1995, leg. J.R. García (AH 20698); CÓRDOBA, Fuente Obejuna, Cortijo El Río, on grasses and debris of *Eucalyptus* sp., 1-XI-1997, leg. J.R. García (AH 46531, with *Didymium megalosporum* and *Physarum pusillum*); Finca El Cintado, on debris of *Eucalyptus* sp., 27-XI-1995, leg. J.R. García (AH 20712, with *Didymium megalosporum*).

Didymium rubeopus G. Moreno, A. Castillo & Illana,

Congr. Int. Sist. Ecol. Myxomycetes: 57. 1996.

FIG. 9

SPECIMEN EXAMINED: SPAIN, CÁCERES, Hoyos, at the end of the village, crossroads with the road to Cilleros, on leaves of *Quercus suber*, 26-XI-1995, leg. J.R. García (AH 20690).

COMMENTS—*Didymium rubeopus* is closely related macroscopically to other foliicolous species such as *D. laxifilum*. However, *D. rubeopus* shows a capillitium formed by narrower (2–4 µm diam.) threads, compared to 5–8 µm diam. of *D. laxifilum*, its spores are smaller, 9–11 µm diam. (10–13 µm diam. for *D. laxifilum*), and its spores are ornamented by tall pila distributed evenly over the surface and sometimes attached to each other. In contrast, the spores of *D. laxifilum* have short crests (Moreno & al. 1997).

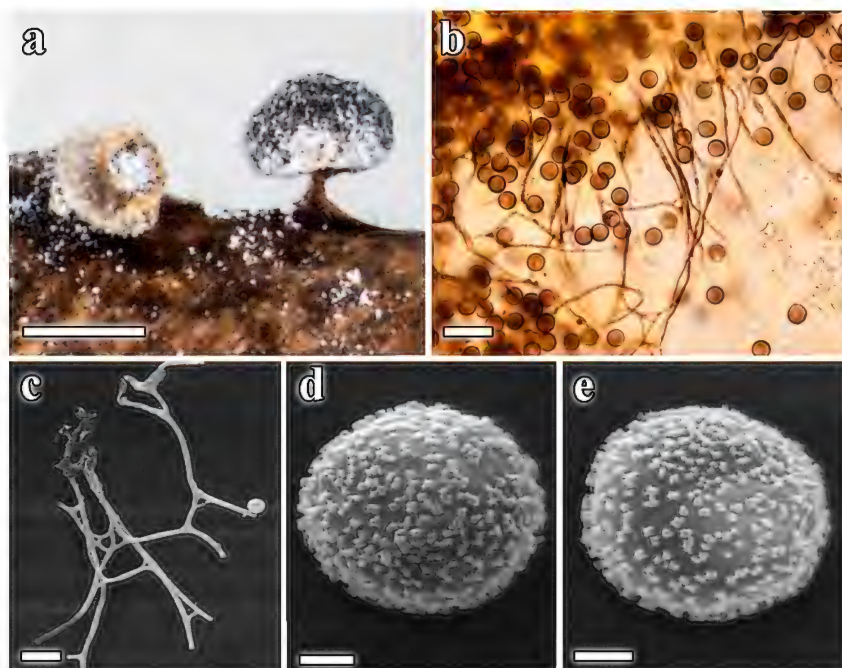


FIG. 9. *Didymium rubeopus* (AH 20690). a. Sporocarps. b. Capillitium. c. Detail of ramifications of the capillitium (SEM). d-e. Detail of spore ornamentation (SEM). Scale bars: a = 1 mm, b = 25 μ m, c = 20 μ m, d-e = 2 μ m.

Didymium squamulosum (Alb. & Schwein.) Fr., Symb. Gasteromyc.: 19. 1818.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Pallares, road to Ventas del Culebrín, km 2, on debris of *Populus alba*, *Ulmus* sp., and grasses, 3-XII-1995, leg. J.R. García (AH 20693); Azuaga, Arroyo Argallón, on leaves and twigs of *Rubus* sp., 20-I-1990, leg. J.R. García (AH 48674); on leaves of *Nerium oleander*, 12-XII-1991, leg. J.R. García (AH 16258); Arroyo El Cañaveral, on leaves of *Nerium oleander*, 10-I-1993, leg. J.R. García (AH 16174); on leaves of *Quercus obtusifolia*, 10-I-1993, leg. J.R. García (AH 48748); 450 m, on debris of *Nerium oleander*, 26-XII-1996, leg. J.R. García (AH 20682); Cortijo La Herejía, 550 m, on leaves of *Ulmus minor*, 26-I-1998, leg. J.R. García (AH 48739, AH 48740); Finca La Jacoba, on leaves of *Quercus obtusifolia*, 6-III-1992, leg. J.R. García (AH 16338, with *Didymium bahiense*, *D. clavus*, and *D. megalosporum*); Granja de Torrehermosa, Arroyo Quejigo, on debris of *Populus nigra*, 12-XI-1993, leg. J.R. García (AH 48706, with *Physarum leucophaeum*; AH 48708); on leaves of *Populus* sp. and *Juncus* sp., 22-XII-1994, leg. J.R. García (AH 48685, with *Didymium difforme*); on debris of *Juncus* sp. and grasses, 24-I-1995, leg. J.R. García (AH 20718); Peraleda del Zaucejo, Las Hoyas mountain pass, on twigs and leaves of *Quercus suber*, 12-XII-1989, leg. J.R. García (AH 48675); CÁCERES, Hoyos, at the end of the village, crossroads with the road to Cilleros, on leaves and twigs of *Quercus suber*, 26-XI-1995, leg. J.R. García (AH 20708);

AH 20716, with *Physarum album* and *P. bivalve*); CÓRDOBA, Fuente Obejuna, Finca Las Canalejas, on leaves of *Nerium oleander*, 29-XI-1991, leg. J.R. García (AH 48676); Cortijo El Río, on debris of *Eucalyptus* sp., 1-XI-1997, leg. J.R. García (AH 46467; AH 48742).

COMMENTS—Sample AH 48740 illustrates the great morphological variability of *Didymium squamulosum*, consisting of both stalked and sessile sporocarps. Peridium greyish to white. Pseudocolumella patent, flat to subglobose, white to slightly yellow. Stalk with calcium carbonate that varies in color from white to straw-yellow. Capillitium and spores also quite variable. All these characteristics lead us to regard this morphospecies as a species complex.

Didymium vaccinum (Durieu & Mont.) Buchet,

Bull. Soc. Mycol. France 36: 110. 1920.

All three samples show a very pronounced and convex pseudocolumella, capillitial threads emerging perpendicularly to the pseudocolumella, and spores 8–10 µm diam., globose to subglobose, with very conspicuous warts.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Finca La Jacoba, on cladodes of *Opuntia ficus-indica*, 2-I-1992, leg. J.R. García (AH 48681); 6-III-1992, leg. J.R. García (AH 48700); 16-I-1994, leg. J.R. García (AH 48663).

COMMENTS—*Didymium vaccinum* is usually associated with other succulenticolous species such as *Badhamia gracilis* and *Physarum spectabile*. The spore ornamentation has been studied by Moreno & al. (2001).

Hemitrichia clavata (Pers.) Rostaf.,

Jahrb. Nassauischen Vereins Naturk. 27–28: 75. 1873.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on wood of *Nerium oleander*, 1-XI-1991, leg. J.R. García (AH 48690, with *Cribraria violacea*); CÓRDOBA, Fuente Obejuna, Finca Las Canalejas, on wood of *Populus* sp., 9-XI-1991, leg. J.R. García (AH 48691; AH 48692).

Hemitrichia succulenticola G. Moreno, A. Castillo, López-Vill. & A. Sánchez, Bol. Soc. Micol. Madrid 41: 32. 2017.

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Azuaga, close to Finca La Jacoba, on cladodes of *Opuntia ficus-indica*, 6-III-1992, leg. J.R. García (AH 48703).

COMMENTS—This species was described recently by Moreno & al. (2017a). It normally occurs on fallen cladodes of *Opuntia ficus-indica*. *Hemitrichia succulenticola* is characterised by its capillitium formed by threads with spiny spirals, spiny swellings, and a few free ends represented as short tips. Spores 11–13 µm diam.

Lamproderma scintillans (Berk. & Broome) Morgan,

J. Cincinnati Soc. Nat. Hist. 16: 131. 1894.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on debris of *Heracleum mantegazzianum* and *Mentha suaveolens*, 1-XI-1997, leg. J.R. García (AH 46471, with *Didymium nigripes*); Granja de Torrehermosa, Granja-Peraleda road, km 10, Zújar river, on leaves of *Salix fragilis*, 15-X-1992, leg. J.R. García (AH 48670); CÓRDOBA, Fuente Obejuna, Cortijo El Río, on grasses and debris of *Eucalyptus* sp., 1-XI-1997, leg. J.R. García (AH 46470).

Leocarpus fragilis (Dicks.) Rostaf., Sluzowkce Monogr.: 132. 1874.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, close to Finca La Jacoba, on leaves of *Quercus obtusifolia* and on cladodes of *Opuntia ficus-indica*, 16-I-1994, leg. J.R. García (AH 48664, with *Physarum spectabile*); Mérida, Cornalvo Roman water reservoir, on twigs of *Quercus suber* and leaves of *Cistus* sp., 20-XI-1993, leg. J.R. García (AH 48665); CÁCERES, Almaraz, on rocks and leaves, 9-XI-1991, leg. G. Moreno (AH 46472); Hoyos, at the end of the village, crossroads with the road to Cilleros, on leaves of *Quercus suber*, 26-XI-1995, leg. J.R. García (AH 20695); Navalmoral de la Mata, La Bazagona pine forest, on plant debris, 6-XII-2000, leg. G. Moreno (AH 46473).

Licea kleistobolus G.W. Martin, Mycologia 34: 702. 1942.

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo El Cañaveral, on wood of *Nerium oleander*, 24-I-1995, leg. J.R. García (AH 48695, with *Arcyria affinis*, *Comatricha nigra*, and *Physarum album*).

Lycogala flavofuscum (Ehrenb.) Rostaf.,

Jahrb. Nassauischen Vereins Naturk. 27–28: 68. 1873.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, 540 m, on wood of *Populus nigra*, 29-VI-1997, leg. J.R. García (AH 48746); Granja de Torrehermosa, Arroyo Quejigo, on wood of *Populus* sp., 12-X-1992, leg. J.R. García (AH 48683); CÁCERES, Cáceres, in city center, on leaf litter of *Quercus* sp., 18-VII-2015, leg. Soc. Micol. Madrid (AH 46526).

Mucilago crustacea F.H. Wigg., Prim. Fl. Holsat.:112. 1780.

SPECIMEN EXAMINED: SPAIN, CÁCERES, Almaraz, on dried grasses (*Poaceae*), 9-XI-1999, leg. G. Moreno (AH 48747).

Perichaena depressa Lib., Pl. Crypt. Arduenna: 378. 1837.

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Azuaga, Cortijo La Herejía, on bark of *Populus nigra*, 26-I-1998, leg. J.R. García (AH 46469).

Physarum album (Bull.) Chevall., Fl. Gén. Env. Paris 1: 336. 1826.

FIG. 11a

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Pallares, road to Ventas del Culebrín, km 2, on debris of *Populus alba*, 3-XII-1995, leg. J.R. García AH 16424, with *Physarum*

cinereum); **Azuaga**, Arroyo Argallón, on non-determined leaves and twigs, 29-I-1994, leg. J.R. García (AH 16259, with *Didymium nigripes* and *Physarum leucophaeum*); on wood of *Nerium oleander*, 10-VI-1993, leg. J.R. García (AH 16482, with *Comatricha nigra* and *Didymium melanospermum*); Arroyo El Cañaveral, on wood of *Nerium oleander*, 24-I-1995, leg. J.R. García (AH 48694, with *Arcyria affinis*; AH 48695, with *Arcyria affinis*, *Comatricha nigra*, and *Licea kleistobolus*); **Granja de Torrehermosa**, Finca El Revuelo, on wood of *Pinus* sp., 12-XII-1992, leg. J.R. García (AH 16252); **Mérida**, Cornalvo Roman water reservoir, on wood of *Quercus obtusifolia*, 20-XI-1993, leg. J.R. García (AH 48672); **CÁCERES**, **Hoyos**, road to Valverde del Fresno, km 4, on wood and leaves of *Castanea sativa*, 25-XI-1995, leg. J.R. García (AH 20704); on wood and leaves of *Castanea sativa* and leaves of *Quercus pyrenaica*, 25-XI-1995, leg. J.R. García (AH 20710); at the end of the village, crossroads with the road to Cilleros, on leaves of *Quercus suber*, 26-XI-1995, leg. J.R. García (AH 20716, with *Didymium squamulosum* and *Physarum bivalve*); **CÓRDOBA**, **Fuente Obejuna**, Cortijo El Río, on debris of *Eucalyptus* sp., 1-XI-1997, leg. J.R. García (AH 46467).

Physarum bethelii T. Macbr. ex G. Lister, Monogr. Mycetozoa, ed. 2: 57. 1911.

SPECIMEN EXAMINED: SPAIN, **BADAJOS**, **Azuaga**, Cortijo La Herejía, 550 m, on bark of *Populus nigra*, 29-I-1998, leg. J.R. García (AH 46466).

Physarum bivalve Pers., Ann. Bot. (Usteri) 15: 5. 1795.

SPECIMEN EXAMINED: SPAIN, **CÁCERES**, **Hoyos**, at the end of the village, crossroads with the road to Cilleros, on leaves of *Quercus suber*, 26-XI-1995, leg. J.R. García (AH 20716, with *Didymium squamulosum* and *Physarum album*).

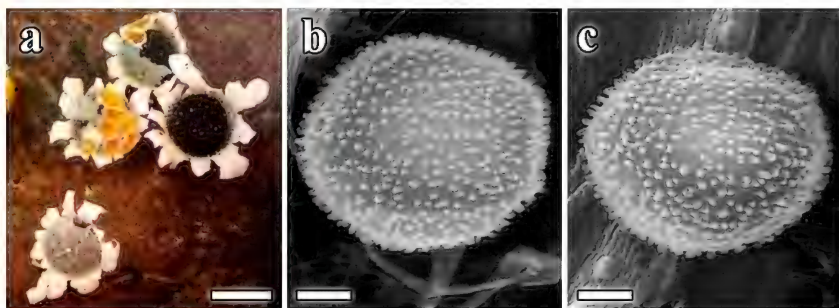


FIG. 10. *Physarum brunneolum* (AH 20680). a. Sporocarps. b-c. Detail of spore ornamentation (SEM). Scale bars: a = 1 mm, b-c = 2 μ m.

Physarum brunneolum (W. Phillips) Masee,

Monogr. Myxogastr.: 280. 1892.

FIG. 10

SPECIMENS EXAMINED: SPAIN, **BADAJOS**, **Azuaga**, Finca Casas Viejas, 380 m, on leaves of *Quercus obtusifolia*, 26-XII-1995, leg. J.R. García (AH 20680).

COMMENTS—The mature peridium of these sporocarps breaks apart in a tessellated fashion, in contrast with the dehiscence observed by Poulain

& al. (2011). Under SEM the spore ornamentation is formed by baculae homogeneously scattered over the surface.

Physarum cinereum (Batsch) Pers., Neues Mag. Bot. 1: 89. 1794.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Pallares, road to Ventas del Culebrín, km 2, on remains of *Populus alba*, 3-XII-1995, leg. J.R. García (AH 16424, with *Physarum album*); 540 m, on branch of *Rubus* sp., 3-XII-1995, leg. J.R. García (AH 20707); Azuaga, finca «Casas Viejas», 380 m, on leaves of *Quercus obtusifolia*, 26-XII-1995, leg. J.R. García (AH 20679); Granja de Torrehermosa, finca «El Río», on leaves of *Populus alba*, 7-VII-1992, leg. J.R. García (AH 16332); arroyo Quejigo, on remains of herbaceous plants, 24-XI-1995, leg. J.R. García (AH 20692); CÁCERES, Hoyos, road to Valverde del Fresno, km 4, on leaves of *Castanea sativa* and *Quercus pyrenaica*, 25-XI-1995, leg. J.R. García (AH 20699); road junction of Cilleros, on leaves of *Quercus suber*, 26-XI-1995, leg. J.R. García (AH 20717); CÓRDOBA, Fuente Obejuna, cortijo del Río, on remains of herbaceous plants and wood of *Eucalyptus* sp., 1-XI-1997, leg. J.R. García (AH 46529).

Physarum clavisporem G. Moreno, A. Sánchez,

A. Castillo & Illana, Bol. Soc. Micol. Madrid 33: 143. 2009.

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Granja de Torrehermosa, close to the river, on stems of *Foeniculum vulgare*, 27-XII-1993, leg. J.R. García (AH 48662).

COMMENTS—The sample is sparse, consisting of only one sporocarp and a semi-permanent slide. *Physarum clavisporem*, described by Moreno & al. (2009), was collected recently in Chile by Lado & al. (2013).

Physarum hongkongense Chao H. Chung, Slime Moulds Hong Kong: 19. 1997.

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Azuaga, Cortijo La Herejia, on leaves of *Populus nigra*, 26-I-1998, leg. J.R. García (AH 46468).

COMMENTS—The sample is sparse, consisting of one sporocarp and semi-permanent slide. The sporocarps of *Physarum hongkongense* are sessile, strongly compressed laterally, constricted at the base, and with a double peridium, the outer layer calcareous, crustose, bright yellow at the outer surface. *Physarum bogoriense* Racib. is a related species that differs from *P. hongkongense* by sporocarps that are not flattened laterally and the apical dehiscence in triangular lobes (Chung & Tzean 1998). There are no remarkable anatomical differences between the two species (spore measures and capillitial shape and colour), so the differences are only macroscopical (Moreno & al. 2017b).

Physarum leucophaeum Fr., Symb. Gasteromyc.: 24. 1818.

FIG. 11b

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Aldea de Cardenchoa, on twigs of *Quercus obtusifolia*, 29-XII-1991, leg. J.R. García (AH 16245); Arroyo Argallón, on non-determined leaves, leg. J.R. García (AH 16259, with *Physarum album* and *Didymium*



FIG. 11. a. Sporocarps of *Physarum album* (AH 16259). b. Sporocarps of *Physarum leucophaeum* (AH 16259). c. Sporocarps with white pseudocolumella of *Physarum robustum* (AH 16407). Scale bars: a–c = 0.5 mm.

nigripes); on leaves of *Quercus obtusifolia*, 3-II-1991, leg. J.R. García (AH 16305); **Calera de León**, Cortijo La Cabra de Abajo, on wood of *Quercus obtusifolia*, 10-XII-1994, leg. J.R. García (AH 18430); **Granja de Torrehermosa**, Finca El Revuelo, on wood of *Pinus* sp. and leaves of *Nerium oleander*, 20-XII-1991, leg. J.R. García (AH 16251); Finca El Río, Zújar river, on twigs of *Quercus obtusifolia* and debris of *Juncus* sp., 24-VI-1992, leg. J.R. García (AH 16175, with *Didymium nigripes*); Arroyo Quejigo, on debris of *Populus nigra*, 12-XI-1993, leg. J.R. García (AH 48706, with *Didymium squamulosum*); **Mérida**, Cornalvo Roman water reservoir, on wood of *Quercus obtusifolia*, 20-XI-1993, leg. J.R. García (AH 16399); on wood of *Quercus suber*, 20-XI-1993, leg. J.R. García (AH 16418); **Monterrubio de la Serena**, Calabar mountain pass, on wood of *Quercus suber*, 13-XI-1993, leg. J.R. García (AH 48713); **CÓRDOBA**, **Fuente Obejuna**, Finca Las Canalejas, on wood of *Nerium oleander*, 7-I-1993, leg. J.R. García (AH 16145); Cortijo El Río, *Quercus obtusifolia*, 11-XII-1993, leg. J.R. García (AH 16426).

COMMENTS—Sample AH 16305 is interesting because it shows the sessile form of this species.

Physarum pusillum (Berk. & M.A. Curtis) G. Lister,
Monogr. Mycetozoa, ed. 2: 64. 1911.

SPECIMENS EXAMINED: **SPAIN**, **BADAJOS**, **Azuaga**, Arroyo Argallón, on leaves of *Nerium oleander*, 3-X-1989, leg. J.R. García (AH 16728); **Granja de Torrehermosa**, Arroyo Parralejo, 480 m, on grasses, 19-X-1997, leg. J.R. García (AH 48735); Finca El Río, on grasses and debris of *Juncus* sp., 24-VI-1992, leg. J.R. García (AH 16249); close to the river, on riverside grasses, 15-XI-1994, leg. J.R. García (AH 48709); **CÓRDOBA**, **Fuente Obejuna**, Cortijo El Río, on grasses and debris of *Eucalyptus* sp., 1-XI-1997, leg. J.R. García (AH 46531, with *Didymium megalosporum* and *D. nigripes*).

COMMENTS—There are umbilicate sporocarps in samples AH 48709, AH 16249, and AH 48735. This form of *Physarum pusillum* was known and accepted by Lister (1925) and also by Poulain & al. (2011). In any case, *P. pusillum* has been compared with *P. xylophilum* Shuang L. Chen & Yu Li, a very similar species

described by Chen & Li (1998) that differs in its spore size and ornamentation. *Physarum pusillum* has spores 9–10 µm diam. and warted ornamentation with groups of warts, whereas in *P. xylophilum* the spores are 11–13 µm diam. and nearly smooth.

Physarum robustum (Lister) Nann.-Bremek.,

Proc. Kon. Ned. Akad. Wetensch., C 87(1): 91. 1984.

FIG. 11c

This species is characterised by its dark stalk and its white pseudocolumella from which the capillitium radiates. This is perfectly visible in the sample AH 20694.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, **Peraleda del Zaucejo**, El Alcorcón meadow, on wood of *Eucalyptus* sp., 11-XII-1993, leg. J.R. García (AH 16407); CÁCERES, **Hoyos**, road to Valverde del Fresno, km 4, on leaves of *Castanea sativa*, 25-XI-1995, leg. J.R. García (AH 20694).

Physarum spectabile Nann.-Bremek., Lado & G. Moreno,

Proc. Kon. Ned. Akad. Wetensch., C 76(5): 484. 1973.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, **Azuaga**, Fuente «La Jacoba», on cladodes of *Opuntia ficus-indica*, 29-I-1992, leg. J.R. García (AH 16130); 6-III-1992, leg. J.R. García (AH 16159); 10-X-1992, leg. J.R. García (AH 16133; AH 16151; AH 16171); 13-XI-1992, leg. J.R. García (AH 16340); 23-X-1993, leg. J.R. García (AH 16302); 16-I-1994, leg. J.R. García (AH 48664, with *Leocarpus fragilis*); 23-X-1997, leg. J.R. García (AH 48733, with *Badhamia gracilis*; AH 48752).

COMMENTS—Sporocarps of *Physarum spectabile* are greyish and often laterally compressed. Capillitium formed by small, globose, white nodes. Spores polyhedral.

Reticularia jurana Meyl., Bull. Soc. Vaud. Sci. Nat. 44: 297. 1908.

SPECIMEN EXAMINED: SPAIN, CÁCERES, **Guadalupe**, on trunk of *Eucalyptus globulus*, 7-III-1997, leg. G. Moreno & H. Kreisel (AH 48743).

Reticularia splendens Morgan, J. Cincinnati Soc. Nat. Hist. 15: 137. 1893.

SPECIMEN EXAMINED: SPAIN, BADAJOZ, **Azuaga**, Finca La Sierra, on stump of *Eucalyptus* sp., 1-XII-1989, leg. J.R. García (AH 48682).

Stemonitis axifera (Bull.) T. Macbr., N. Amer. Slime-Moulds: 120. 1899.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, **Azuaga**, road to Cardenchosa, Benibezar river, on woody debris, 20-III-1987, leg. J.R. García (AH 16193); CÁRDABA, **Fuente Obejuna**, Cortijo El Río, 500 m, on wood of *Salix fragilis*, 22-IV-1996, leg. J.R. García (AH 16735); 1-XII-1997, leg. J.R. García (AH 46475).

Stemonitis flavogenita E. Jahn,

Verh. Bot. Vereins Prov. Brandenburg 45: 165. 1904.

Sporocarps violaceous-brown. Stalk and columella dark and shining, with the columellar apex ending in a funnel-shaped structure. Capillitium spiny and forming an external net with meshes of different diameters; main branches perpendicular to the columella. Spores 6.5–7.5 µm diam., globose to subglobose, pale violaceous-brown, verrucose.

SPECIMENS EXAMINED: SPAIN, CÁCERES, Jaraíz de la Vera, *Quercus pyrenaica*, 27-VIII-2001, leg. F. Prieto (AH 48745); CIUDAD REAL, Parque Nacional de Cabañeros, *Quercus pyrenaica*, 18-X-2001, leg. G. Moreno (AH 48750).

Stemonitis fusca Roth, Bot. Mag. (Römer & Usteri) 1(2): 26. 1787.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, 540 m, on wood of *Nerium oleander* and twigs of *Rubus* sp., 19-X-1997, leg. J.R. García (AH 46530, with *Craterium leucocephalum*); Granja de Torrehermosa, Arroyo Quejigo, on wood of *Populus alba*, 19-XI-1994, leg. J.R. García (AH 16168); 24-I-1995, leg. J.R. García (AH 20691).

Stemonitis splendens Rostaf., Sluzowkce Monogr.: 195. 1874.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo El Cañaveral, on wood of *Nerium oleander*, 20-I-1995, leg. J.R. García (AH 48689); 24-I-1995, leg. J.R. García (AH 48693); CÁCERES, Hoyos, road to Valverde del Fresno, km 4, on wood of *Castanea sativa*, 25-XI-1995, leg. J.R. García (AH 20700).

Stemonitopsis typhina (F.H. Wigg.) Nann.-Bremek.,

Nederlandse Myxomyceten: 209. 1975 ["1974"].

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on non-determined wood, 31-V-1993, leg. J.R. García (AH 16293, with *Comatricha* sp.); Mérida, Cornalvo Roman water reservoir, on wood of *Quercus suber*, 20-XI-1993, leg. J.R. García (AH 48671).

Trichia affinis de Bary, Jahrb. Nassauischen Vereins Naturk. 23–24: 336. 1870.

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on wood of *Nerium oleander*, 7-VI-1991, leg. J.R. García (AH 16372, with *Arcyria cinerea*).

Trichia contorta var. *karstenii* (Rostaf.) Ing,

Trans. Brit. Mycol. Soc. 48: 647. 1965.

FIG. 12

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on wood of *Nerium oleander*, 20-XII-1991, leg. J.R. García (AH 16480).

COMMENTS—This variety is represented by deep reddish brown sessile sporocarps to short plasmodiocarps, capillitial tubes with swellings and ornamented with tight spiral bands (Nannenga-Bremekamp, 1991).

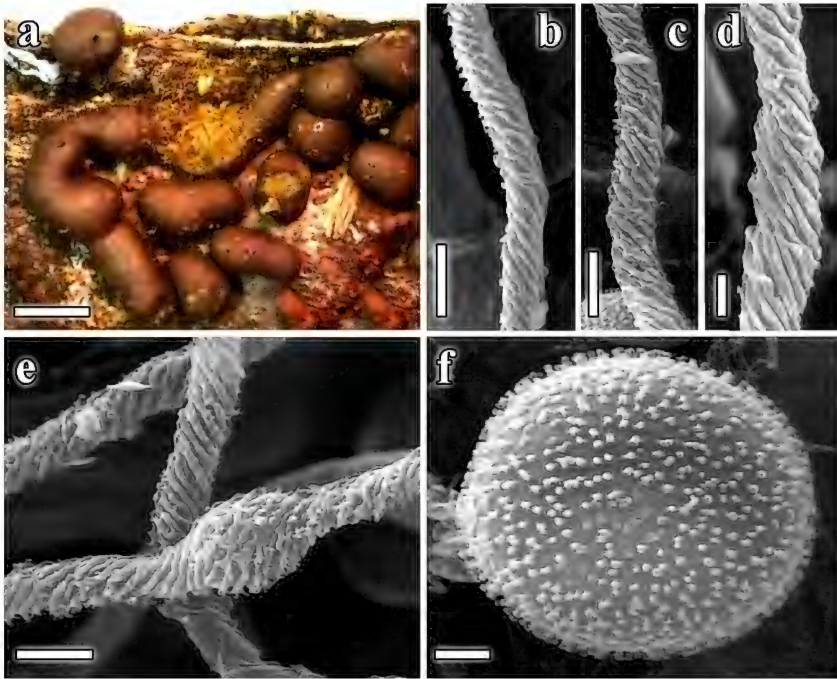


FIG. 12. *Trichia contorta* var. *karstenii* (AH 16480). a. Sporocarps. b-d. Detail of the capillitium (SEM). e. Swellings of capillitium (SEM). f. Detail of the spore ornamentation (SEM). Scale bars: a = 1 mm, b, c, e = 5 μ m, d, f = 2 μ m.

Trichia crateriformis G.W. Martin, Mycologia 55: 131. 1963.

FIG. 13

= *T. fallax* var. *olivacea* Meyl., Bull. Soc. Vaud. Sci. Nat. 44: 300. 1908.

≡ *T. decipiens* var. *olivacea* (Meyl.) Meyl., Bull. Soc. Vaud. Sci. Nat. 55: 244. 1924.

≡ *T. decipiens* f. *olivacea* (Meyl.) Y. Yamam., Myxomycete Biota Japan: 237. 1998.

Sporocarps stalked. Sporotheca greenish olive with dehiscence well marked by means of a circular area. Capillitium formed by pale yellow elaters (7–8 μ m diam.), ornamented with 3–4 broad and smooth long-tipped spirals. The capillital elaters under SEM are smooth and marked with tightly-packed spirals. Spores globose to subglobose, 11–12.5 μ m diam., pale yellow by transmitted light, spinulose to crested ornamentation evenly distributed. Under SEM the spore ornamentation is cristate and formed by broad-based ridges that join to form short crests with irregular and sinuous morphology. Sometimes, they join towards the apex to assume a stellate or reticulate appearance.

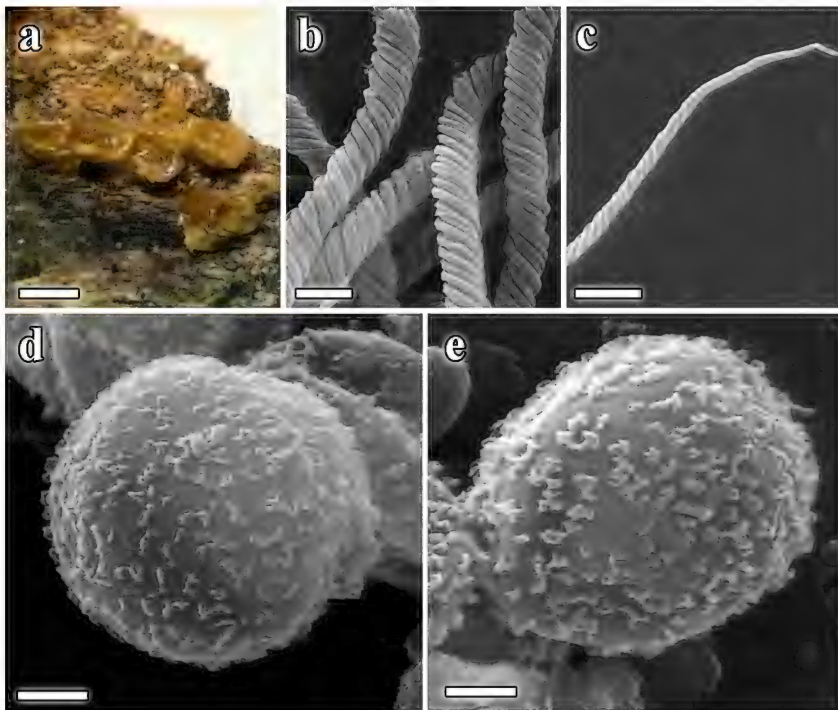


FIG. 13. *Trichia crateriformis* (AH 48744). a. Sporocarps. b. Detail of the capillitium (SEM). c. Detail of one elater of the capillitium (SEM). d-e. Detail of spore ornamentation (SEM). Scale bars: a = 1 mm, b-c = 5 μ m, d-e = 2 μ m.

SPECIMEN EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, on wood of *Nerium oleander*, 9-X-1992, leg. J.R. García (AH 48744, with *Arcyria cinerea*).

COMMENTS—At specific rank, *Trichia crateriformis* has priority over the three synonymous infraspecific names and must be used for this common species in the Mediterranean region. Moreno & Castillo (2013) studied the type specimens of these taxa.

Trichia varia (Pers. ex J.F. Gmel.) Pers., Neues Mag. Bot. 1: 90. 1794.

SPECIMENS EXAMINED: SPAIN, BADAJOZ, Azuaga, Arroyo Argallón, 540 m, on wood of *Populus nigra*, 6-XII-1995, leg. J.R. García (AH 20683, with *Ceratiomyxa fruticulosa*); Granja de Torrehermosa, Arroyo Quejigo, 540 m, on wood of *Populus alba*, 24-XII-1997, leg. J.R. García (AH 46474).

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